The LongPath

August 2021 — Volume 45 Issue 8 A North Alabama DX Club Publication

Contents:

Contributors:

AC4G
AG4W
AJ6T
K4KSV
K8KI
KE4PT
N4AX
N4NM
NG3K
NN4NT
ZL2JPM

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From the President

By Bob DePierre, K8KI

My spirits rise in August because we're going to have a hamfest in a couple of weeks. I participate in every phase of it that I can, and I'm scheduled full up. I hope you are as well. Every year I sign up for what I call "Charlie's Amy," the Friday move in crew – a ton of fun! The day prior my old friend, Steve Smith/KG5VK, will arrive for a 5-day vacation. I've known him for over 40 years, from way back when we were stationed in Germany together. Steve is currently the ARRL Section Manager for North Texas. Of course, I've got a table again (I need too much rest these days). I will also present a forum on "Superhets vs SDRs" on Saturday at 1pm. Y'all be there...OK?

The HARC club has recently shifted their meetings to the Museum of Information Explosion. The title sounds like a misnomer to me, but it is actually the best vintage radio museum I have ever seen. I had thought the Henry Ford Museum had the best radio displays in the world, but no longer. The best is now right here, and HARC meets there on Friday nights. All the radio equipment is currently in place, but it will take a solid year to get it all set up. They need volunteers, and I hope I'm speaking to many of them right now. I've already signed up. Of course, there are no operating hours right now, just working hours and HARC meetings. Once you see this, you'll bite the hook. We'll talk about the museum at the next meeting.

We'll be starting our year-end activities in a month. There's the club picnic in October, the election of officers, the DXer-of-the-year vote, and the Christmas party. I sorta like the end of the year!

Chuck Lewis/N4NM will do the presentation this month. Chuck can weave a yarn better than anybody, and it's even better when it's all true. He hasn't titled it yet, so I'll make up a title: Using modern test equipment on vintage radios. His insights will help you marvel at the genius of engineers working 100 years ago, and make you wonder how they ever figured things out way back then. This will be a multi-part sequence, with Chuck covering crystal, regenerative, tuned RF, and superhet radios.

We got kicked out of our private meeting room last month, and it didn't work out very well for us. We have looked at alternatives, but the pandemic has left many businesses gasping for air and currently not able to support us. So we're looking for ideas.

From the President (continued)

So, let's have the next NADXC club meeting on Tuesday, August 10, at Newk's Eatery on University. The Zoom sign-on will be exactly the same as in the past. I'll send members the Zoom invitation on Sunday just before the meeting. Let's schedule dinner sometime around 5:30; meeting starting at 6:00, and the program a little before 6:15.

Upcoming NADXC meeting:

Tuesday, August 10th, 2021

5:30 PM Dinner

6:00 PM Business Meeting

6:15 PM Program

Location: Newk's and via Zoom

Fun with Magnetic Loops

By John Moriarty, ZL2JPM

The ability to have a lower profile antenna or to be able to quickly and unobtrusively erect an effective portable antenna is well worth consideration. I've invested in 9m poles, strung out half-wave dipoles and verticals in an attempt to retain HF functionality on the road. Mostly, this baggage has accompanied me on my travels as the number of places where such equipment could have been deployed were few indeed. Commercial accommodation was out, and nobody likes to take over the backyard of a friend unless they are also as interested as you are (in which case, just use their rig!). These scenarios favor the magnetic loop antenna (MLA). For a fixed design, the MLA can be as efficient as its dipole alternative, and for a portable design, although less efficient on transmit, it is very effective on receive and is small enough to fit in a slim carry-bag.

ZL2BD's 2m loop

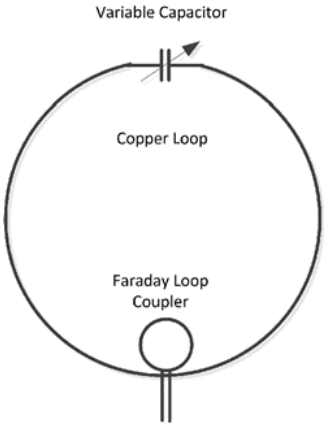
The following pictures put things in perspective. In the first figure, there is a 2m diameter loop constructed by fellow radio-club member Bernard (ZL2BD) and in the second, the portable, table-top 1m loop on its autotuner - constructed by the author. Both antennas are designed for the 40m band but the smaller loop may be tuned, using achievable values of capacitance, from about 3.5 MHz to 28 MHz. In practice, much better outcomes arise from a loop optimized for a particular band.

ZL2JPM's 1m tabletop loop and autotuner

So, raid your shacks (or those of your friends) for lengths of Heliax, RG213 or even old 75ohm RG6 as these materials can be used to construct a loop. If you have lots of ½ in. copper tube, you can also make an excellent full-sized hexagonal or octagonal loop using brazing Tee joiners. It does not have to be circular.

Loop Basics

An MLA is an extremely simple device. It is an LC tuned circuit with the variable capacitor situated opposite an inductive feeder which, in this diagram, is a Faraday Loop made of the same material as the main loop (COAX or Copper tube). The lower the resistance of the loop,



Fun with Magnetic Loops (continued)

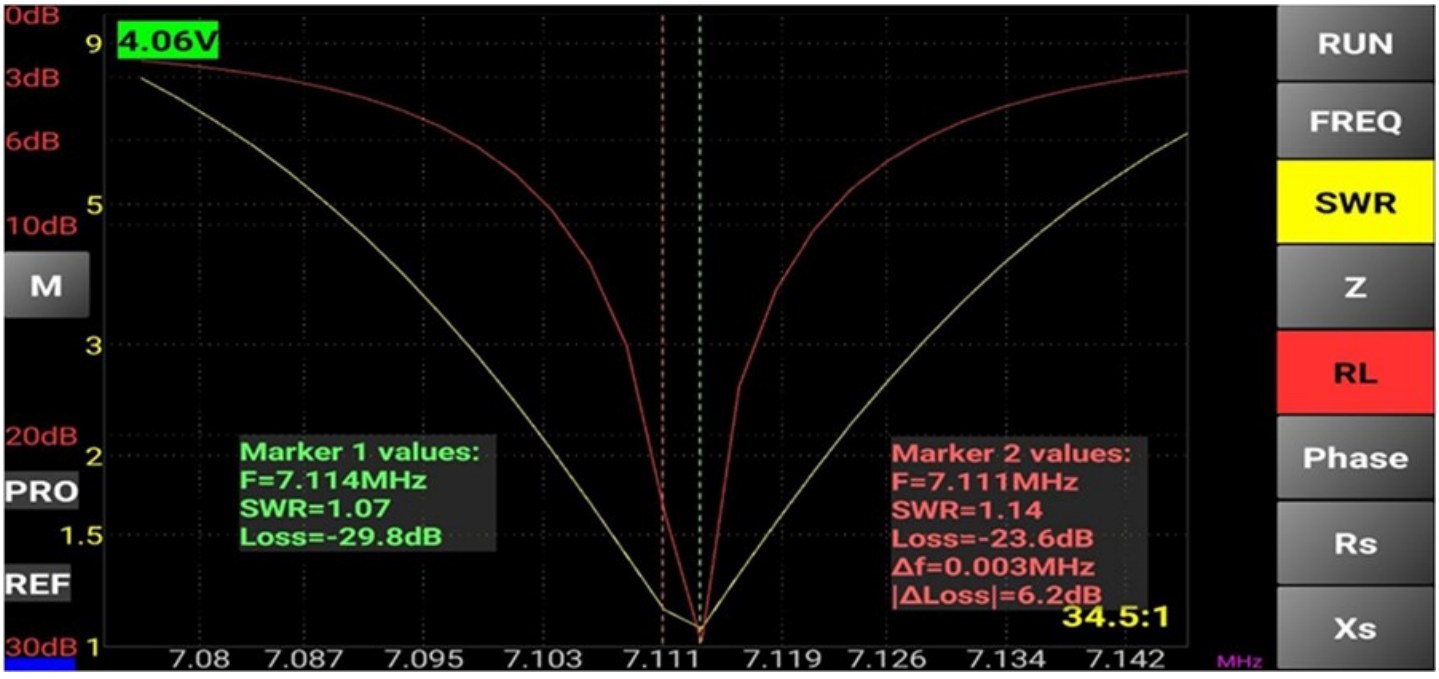
the higher the Q factor and the greater the efficiency of this antenna. If you come across a military specification loop, you may even find that it is silver plated. Low R is essential! Matching the antenna to the transceiver is achieved by tuning the capacitor until the SWR is minimized. In practice, expect an SWR to be in the range 1.05 to 1.2. Although match quality is generally outstanding, the bandwidth is quite small. At resonance, expect the bandwidth to be a few KHz. No trouble for single frequency SSB transmissions, but a contester would probably not be satisfied, as any frequency change needs a re-tune. I'm not a contester, but the thought of an antenna needing to be manually tuned evokes the same response. This was the motivator for my design of an automatic tuner for my MLA.

A few other issues should be mentioned. At resonance, MLAs must contend with extremely high voltages and currents - even at low power levels. Imagine an inductor with a series resistance of 0.001Ω and a capacitor with series resistance of 10 MΩ. Suppose the power is 10watts. At resonance, the inductive and capacitive reactance cancel each other out and the current flowing in the outer loop is, in this example, 100 Amps. Looking at it another way, the potential across the capacitor is 10KV! In practice, these heady figures will be somewhat lower, but the message is clear, high-voltage capacitors and low resistance loop tubing are necessary rather than optional.

The last issue is tuning sensitivity to capacitance. A few pF can move the resonant frequency by many KHz. Gear-reduction tuning is essential, or you might easily skip over the frequency you seek. If 13mm tubing is used, variable capacitors for the 40m band are likely to range between 30pF and 120pF. Thicker tubing - say 1 in., requires a variable capacitor to range between 45pF and 150pF. For a portable 1m loop operating on 40m at 20W or less, these issues are hardly constraining, but pouring 100W or 1KW into a loop requires very careful attention to construction details and very high voltage capacitors. Remote tuning is also essential at these higher powers - you don't want to be "blown away" for the wrong reason.

Loop Measurements

A Vector Network Analyzer is a great instrument for diagnosing and tuning the MLA. The characteristics of the author's portable loop on



Vector Network Analyzer plot of ZL2JPM's 1m loop antenna

Fun with Magnetic Loops (continued)

the 40m band are shown in the picture below. The yellow trace plots the SWR at the desired frequency of 7.114 MHz. The red line plots the return loss - to assist with an estimation of the Q. The effective bandwidth (SWR<2) of this loop is about 16KHz. The Q factor is defined as the ratio of Reactance to Resistance, or the center frequency divided by the bandwidth at the 3dB points - in this case, estimated at well over 1000. Yes, I've managed to waste a few 120pF capacitors with 10W power and have been relying on charity to get old-fashioned mica replacements from my friends - who still have some of them left.

Does it work?

As with wire antennas, the loop is directional, but in the vertical plane, rather than, as with dipoles, the horizontal plane. This makes rotation a simple affair. The difference experienced between these two orientations is about 2 S-points. The other feature is that the reduced bandwidth of the loop helps to reject broader-spectrum noise - so receive quality improves - also by a few S-points. What is there not to like about that?

Perhaps the highlight of my own experience was during tests on IFROAR's 20m ANZO net. Stationed in the middle of NZ's South Island, I worked (45) Douglas (ZL1BFS) at the top of the North Island (1,000kms), exchanged signal levels (31) with Peter (VK3KCD) in Victoria, Australia and (54) with Bill (VK4ZD) in Brisbane, Australia (> 2,500 kms). Pleasingly, I also clearly copied (42) Vernon (G0EGW) in the UK, but due to a mistake, had the loop pointing the wrong way and he was unable to copy me! All this from the IC-705 on 10W. In this case, the loop was sitting on a picnic table in the backyard of a holiday-house (elevation 1,100ft or 338m) - with a nearby 2,000 ft hill on the short path (to Australia) and no obstruction on the long-path (to UK).

However good the MLA might be for DX, it is not so good if NVIS is to be relied upon. The MLA's take- off angle is low, and unless QSOs are "quite local", you may find that outside a radius of, perhaps, 50Km it is not as good as alternatives.

Tuning Issues

There are numerous examples of MLAs being tuned via wired controllers - such as a small DC motor that rotates the variable capacitor whilst the operator listens for heightened receive volume and then fine-tunes further using low power TX. Once on frequency, the MLA is generally stable and does not need constant adjustment - that is, until you QSY. It is one thing to run coax to the antenna, but the necessity for other cables to control tuning invites the question, why? There are also many wire antenna tuners that can tune quickly and successfully with only 13.8v and the RF - the SGC series spring to mind.

The concept of an automatic MLA tuner is straightforward: sense the presence of RF, monitor the reflected power (voltage) from the antenna, and keep adjusting the capacitor until there is no reflected power. Capacitors can be rotated by stepper motors or servos under instruction from a microprocessor (the familiar Arduino Nano - for example), which can also measure suitably rectified and filtered RF in both forward and reverse directions - using a bridge - just like the cross-needle SWR meters do. A bit of computer code that instructs the microprocessor to do these things should result in "hands-off" tuning.

Like all simple concepts, the devil lies in the detail. Whilst I'm happy that my "bit of computer code" actually works, it still needs a bit more sophistication to speed up the tuning process and to make sure that any initial estimates of the correct capacitor position are monitored to keep the SWR at the optimum point.

Placement of a microprocessor in a box shared with strong magnetic and electric fields from the loop and potential induction from the SWR bridge called for copper foil shielding and the use of a transformer to eliminate common-mode noise from the sense lines.

The photo of the working prototype shows the tuner locked (on 7.114 MHz), with indicated SWR of 1, capacitor angle 132 degrees. When RF is present, the forward and reverse voltages from

Fun with Magnetic Loops (continued)

the SWR bridge are also displayed - more for diagnostic reasons than anything else. If the SWR increases beyond 1.9, the tuner seeks a new tuning point and locks onto that. At present, it can take about 5 seconds to tune, but a better search technique might improve this.

As with most of my amateur radio projects, the thrill of the chase can get in the way of reliability. I'm committed to using the MLA in portable applications with my IC-705 and in this case, reliability is essential.

In summary, the MLA is a very worthy alternative to the space-hungry wire antennas that most of us have. They are probably as easy to make as a good wire antenna and in most cases would escape the visual amenity restrictions that exist in many jurisdictions. For portable operation, the ability to collapse the antenna into a small carry-bag that weighs only a few pounds (<2 Kg) is very compelling - especially so since assembly-time is measured in minutes. An auto-tuner adds useful panache, leaving the operator to enjoy the band.

ZL2JPM's autotuner prototype

Moriarty, John. "Fun with Magnetic Loops." The Communicator, Rotarians of Amateur Radio, June 2021, Pages 5-9.

Ionospherica

By "Kai" Siwiak, KE4PT

Antenna Pattern Peaks and Nulls — A Calculator Solution

You can hand-sketch a pretty good approximation of the vertical pattern for a horizontally polarized antenna elevated above ground (Figure 1). Furthermore you don't need any electromagnetic modeling software such as numerical electromagnetic code (NEC) to do so.

NEC, as implemented in several popular software packages like *EZNEC*[1] and *4nec2*[2], can give excellent results for modeling your antenna in free space, or over a perfectly flat and perfectly smooth Earth. But a hand calculator is all you need to find basic pattern features like peak and null angles. A scientific calculator such as *calc.exe* is available in every version of Microsoft Windows, or a calculator app on your smart phone, will do the job. Just specify the antenna height above ground in wavelengths.

Imagine that you've set up camp and hung your portable station dipole up at about 10 m height (30 ft). You're ready to try some 28 MHz CW. Curious about the elevation plane dipole pattern?

Elevation Peaks and Nulls

We've already seen the phenomenon responsible for pattern nulls and peaks due to ground reflections in the October 2013 *Ionospherica* column.[3] Signals arriving from the distant ionosphere take a direct and a ground-reflected path, to form a vertical standing wave pattern at the receiving antenna location.

In the present example, we've chosen an antenna height based on physical limitations at our camp site. Figure 2 shows the details of the signal paths. For signals transmitted to, or received from, an elevation angle α, there are two paths to/from the dipole placed at a height of H_λ wavelengths.

Ionospherica (continued)

There is a direct path, and a ground-reflected path. The path lengths differ, and the ground reflected path undergoes a phase change upon ground reflection. For shallow angles that ground reflection coefficient is -1. So we immediately know that the "zero order null" in the elevation pattern is at α=0°!

The Pattern Nulls

First we determine how many peaks *p* there are in a forward quadrant of the antenna pattern. We answered that in the October 2015 *Ionospherica,*

$$p = 2H_\lambda \qquad (1)$$

Note that *p* need not be an integer — as H_λ increases, peaks continue to be added gradually from the vertical direction, while the lower angle peaks get compressed, see Figure 3.

Also, the straight up (90° elevation) peak maximum occurs for antennas that are at even multiples of a half wavelength, minus a quarter wavelength, such as 0.25λ, 0.75λ, 1.25λ, 1.75λ, and so on.

The number of nulls above the zero angle null is the integer part of *p*.

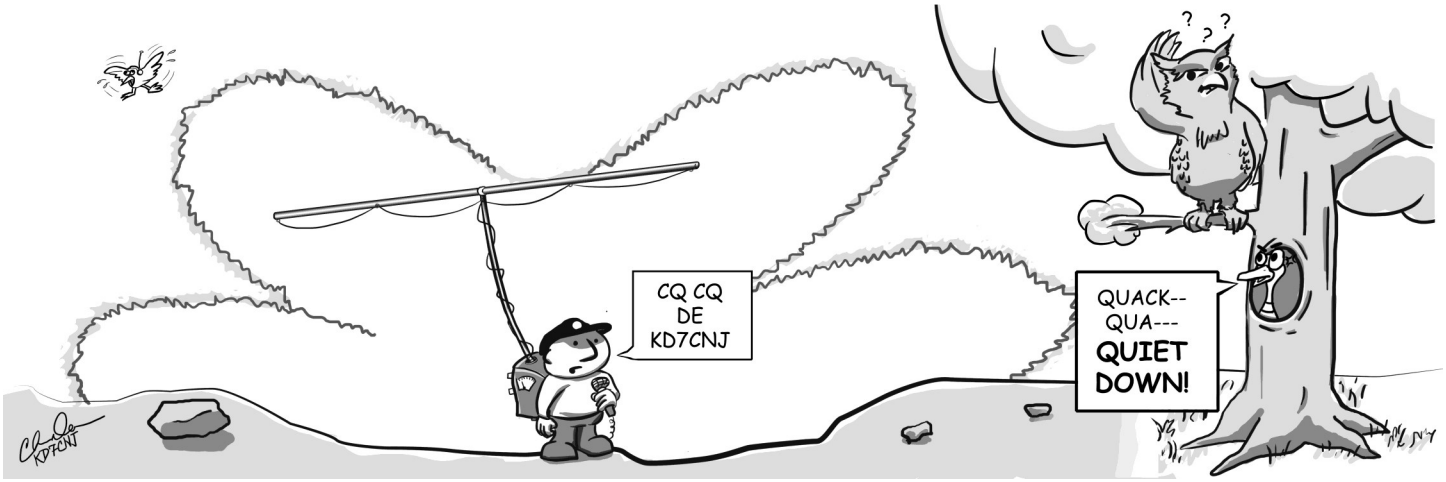


Figure 1 – You can predict the number of peaks, and the peak and null angles of your horizontal dipole using a calculator. [Chris Dean, KD7CNJ, image]

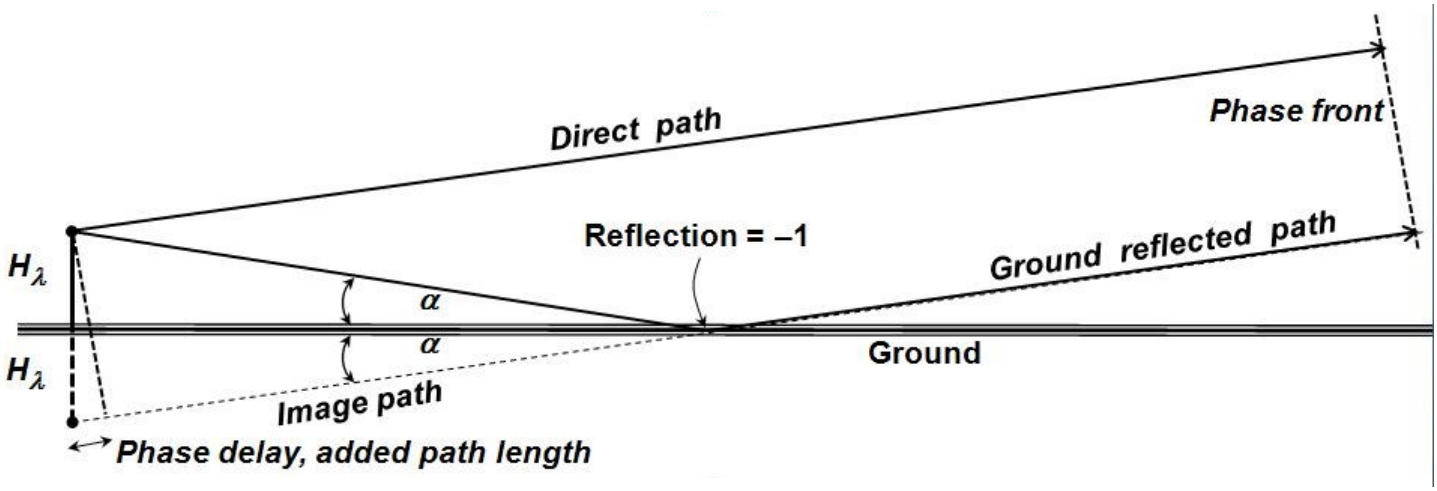


Figure 2 – Using image theory and geometry, the added path length of the ground reflected path is $2H_\lambda \sin(\alpha)$, where H_λ is the antenna height.

Ionospherica (continued)

Using simple geometry and image theory, see Figure 2, we can see that the ground-reflected path is $2H_\lambda \sin(\alpha)$ longer than the direct path to the distant horizon. Also, signals along the ground reflected path are multiplied by the -1 ground reflection coefficient. The signal copies along the two paths will cancel whenever the added path length, or phase delay, is a multiple *m* of a wavelength λ. That is,

$$2H\lambda\sin(\alpha) = m\lambda \qquad (2)$$

Solve for the angle α of the *m*-th null,

$$\alpha_{m\_NULL} = \arcsin\left(m/2H_\lambda\right) \qquad (3)$$

I used a simple scientific calculator with the inverse sine function!

The *m*=0 null occurs at 0°, and the first null is at α_1=arcsin(1/2H_λ).

We hung our 28 MHz dipole at about a 10 m height (H_λ=1), So there are *p*=2 complete lobes in the forward quadrant of the pattern, and 2 nulls above the 0° null: one at arcsin(1/2)=30°, and the second at arcsin(2/2)=90°.

The Pattern Peaks

The signal copies travel along the two paths and combine constructively to double the

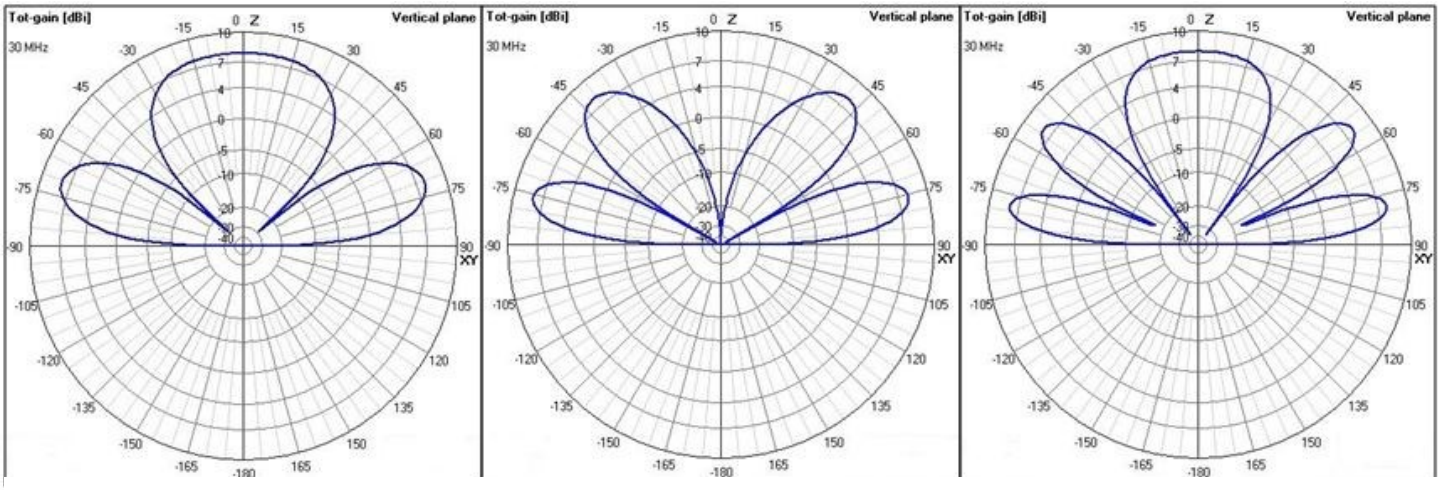


Figure 3 – For a horizontally polarized antenna H_λ wavelengths above ground, use Eq (1), (3) and (5) to discover the number of peaks *p*, in the forward quadrant, the elevation angles α above the horizon of nulls and peaks, which can be verified with *4nec2* as shown above.

[LEFT] H_λ = 0.75, so there are *p* = 1.5 lobes in the forward quadrant; my calculator shows the peaks are at α = 19.5° and 90° above the horizon, and the nulls are at α = 0° and 41.8°.

[CENTER] H_λ = 1.0, so there are *p* = 2.0 lobes in the forward quadrant, the peaks are at α = 14.5° and 48.6° above the horizon, and the nulls are at α = 0°, 30° and 90° above the horizon.

[RIGHT] H_λ = 1.25, so there are *p* = 2.5 lobes in the forward quadrant, the peaks are at α = 11.5°, 36.9° and 90° above the horizon, and the nulls are at α = 0°, 23.6° and 53.1° above the horizon.

When H_λ is a multiple of a half wavelength minus a quarter wavelength, [LEFT and RIGHT], there is a peak 90° above the horizon, whereas if H_λ is a multiple of a half wavelength [CENTER] there is a null at 90°.

Ionospherica (continued)

field strength (+6 dB above the free space value) for a perfect ground — or about 4-5 dB for medium ground — whenever the path difference, or phase delay, is an odd multiple *m* of a half wavelength. That is,

$$2H_\lambda \sin(\alpha) = (2m-1)/\lambda \qquad (4)$$

Solve for the angle α,

$$\alpha_{m\_PEAK} = \arcsin\left((2m-1)/4H_\lambda\right) \qquad (5)$$

which is easily computed on a scientific calculator using the inverse sine function!

The first peak (there is no zero-order peak) happens at α_1 = arcsin (1/4H_λ).

For the 28 MHz dipole at height of 10 m (H_λ=1), the first peak occurs at arcsin(1/4)= 14.5°, and the second one is at arcsin(3/4) = 48.6° as seen in the CENTER pattern in Figure 3.

Verify with NEC

I set up three scenarios with the dipole at 0.75, 1.0, and 1.25 wavelengths above the ground, and used Eq (1) to get the number of nulls *p* in the forward quadrant, and then Eq (3) and (5) to find the elevation angles of the nulls and peaks.

I then used *4nec2*, with a perfect ground, to calculate the antenna patterns to verify my hand-calculated results. Had I used a medium ground, the nulls would not have been so deep, and peaks would be slightly less pronounced, but angles would still match.

Calculator is All You Need

Knowing the height in wavelengths of your dipole antenna, apply the three simple formulas to predict the number of peaks, and the elevation angles of the pattern peaks and nulls.

The peak lobe amplitude is 4 to 6 dBi above the free space value depending on the type of ground.

References

1. EZNEC antenna modeling software, Roy Lewallen, W7EL, www.eznec.com.
2. NEC modeling software 4nec2 by Ari Voors, www.qsl.net/4nec2.
3. K. Siwiak, KE4PT, "Ionospherica, Pitching and Catching Radio Waves — The Last Bounce", QRPQ Vol 54 No. 4, Oct 2013, pp 32-33.

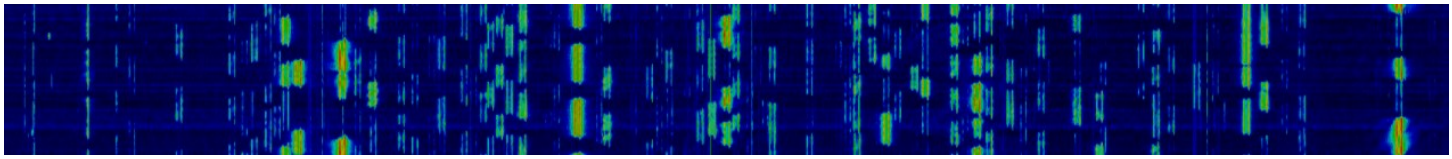
Kazimierz (Kai) Siwiak, KE4PT, is an avid DXer who packs a DX Go-Bag station on his travels.

NADXC Banquet

Saturday, August 21st, 2021

Keynote Speaker:
Adrian Ciuperca, KO8SCA

Tickets are SOLD OUT



Upcoming DX Contests

By Chuck Lewis, N4NM

WAE CW DX Contest, (**CW**), 80-10 meters

Aug 14, 0000Z to Aug. 15, 2359Z

Exchange: RST plus serial No. See web for QTC rules.

See page 71, August QST and www.darc.de

SARL HF Digital Contest (DIG), 80-20 meters

Aug. 15, 1400Z to 1700Z

Exchange: RST, serial no.

See page 71, Aug. QST and www.sarl.org.za

SARTG WW RTTY Contest, (**RTTY**), 80-10 meters

Aug. 21, 0000Z to Aug. 22, 1600Z

Exchange: RST plus Serial No.

See page 71, August QST and www.sartg.com

Keymen's Club of Japan Contest (**CW**), 160-6m

Aug. 21, 1200Z to Aug. 22, 1200Z

Exchange: RST and prefecture or continent

See page 71, August QST and

www.kcj-cw.com

Russian District Award Contest, **(CW, SSB),** 160-10 meters

Aug. 21, 0800Z to Aug. 22, 0800Z

Exchange: RS(T), Serial or Russian District

See page 71, August QST and

rdaward.org/rdac1.htm

YO DX Contest, **(CW,SSB)**, 80-10 meters

Aug. 28, 1200Z to Aug. 29, 1200Z

Exchange: RS(T), Serial or YO district

See page 71, August QST and

Contest Page

Worldwide Digi DX Contest (DIG) 160-10 Meters

Aug. 28, 1200Z to Aug. 29, 1200Z

Exchange: 4-character grid square + SNR

See: Page 71, Aug. QST and

https://ww-digi.com/

SARL HF CW Contest (CW), 80-20 meters

Aug. 29, 1400Z to 1700Z

Exchange: RST, serial no.

See page 71, Aug. QST and www.sarl.org.za

All Asian DX contest, (SSB), 80-10 meters

Sept. 4, 0000Z to Sept. 5, 2400Z

Exchange: RS plus 2-digit age

See: Contest page

WAE DX Contest, (SSB), 80-10 meters

Sept. 11, 0000Z to Sept. 12, 2359Z

Exchange: RS, serial no.

See Contest Page

Note: Beware, dates & times often change or are misprinted in the journals.

DXpeditions in August 2021

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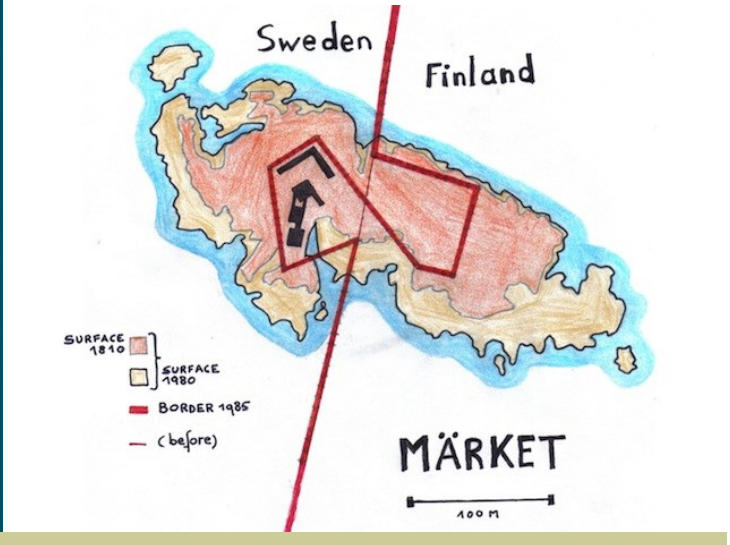
2021 Jul31	2021 Aug08	Faroe Is	NEW NEW OY	DF8AN	By DF8AN as OY/DF8AN; 80-6m; CW + digital
August					
2021 Aug01	2021 Aug30	Dominican Republic	HI9	eQSL	By HB9TUZ as HI9/HB9TUZ fm Las Terransa; 40-10m; SSB
2021 Aug02	2021 Aug23	French Polynesia	FO	eQSL	By F1SMB as FO/F1SMB fm Tahiti, Moorea, Tahaa, Bora Bora, Tikehau, Rangiroa, Fakarava; 40 20m; SSB FT8
2021 Aug09	2021 Aug19	South Cook Is	NEW E51AAO	ZL1AAO (B/d)	By ZL1AAO fm Atiu I (IOTA OC-083) Aug 6-9 and Rarotonga I (IOTA OC-013) Aug 10-19; 40 20m; SSB; 100w; spare time operation
2021 Aug11	2021 Aug16	Bermuda	VP9EE	OZ2I	By OZ2I; CW; QRV for WAE CW Contest
2021 Aug14	2021 Aug29	Azores	NEW CT8	IK2DUW	By IZ2DPX as CT8/IZ2DPX fm Terceira I (HM68jr) Aug 14-19; Faial I (HM68po) Aug 19-23; San Miguel (HM77gs) Aug 23-29
2021 Aug21	2021 Aug25	Ogasawara	JD1	LoTW	By JH1FFW as JD1/JH1FFW; 40-6m; SSB FT8; 50w; QSL via JARL Buro or eQSL
2021 Aug21	2021 Aug28	Market Reef	OJ0WS	OH3WS Buro	By OH3WS; HF; CW
2021 Aug21	2021 Sep30	St Lucia	J68HZ	LoTW	By K9HZ fm Soufriere; HF; mainly FT8 CW SSB; QSL via K9HZ direct w/ SASE or eQSL; operation to continue until Nov 8
2021 Aug25	2021 Aug28	Market Reef	OJ0D	LoTW	By OG7D; some HF SSB; mainly QO-100 satellite
September					
2021 Sep05	2021 Sep19	Dodecanese	SV5	DL2AAZ (B/d)	By DL2AAZ as SV5/DL2AAZ fm Rhodes (IOTA EU-001); 40-10m + QO-100 satellite; SSB CW; 300w; ground planes; holiday style operation



Favorite Rigs Special Edition: Member Memories and Experiences

Introduction

By Fred Kepner, K3FRK

HF rigs are like our children. It's hard to have a favorite but there's usually one that performs a little better, costs you a little less money, or behaves the way you want without a lot of drama. This month our members have highlighted some of their favorites. Enjoy!

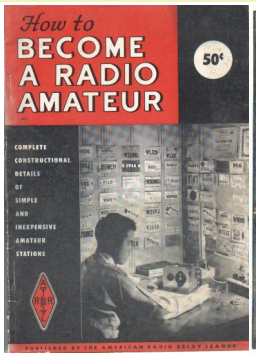
My Favorite Rig

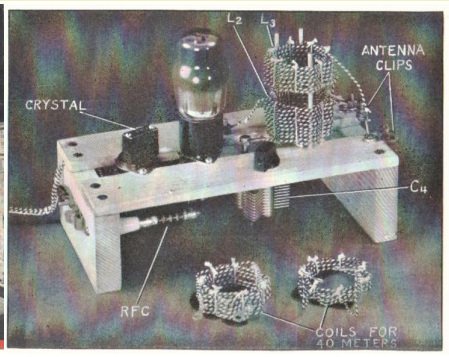
By Chuck Lewis, N4NM

My favorite rig has to be my first one: the combination of a Heathkit AR-2 communications receiver and a homebrew 6V6 single-tube "'Rock Crusher" transmittter. This combo is my favorite and most memorable because I'll never again recreate the magic moments I experienced with my first QSO and the ones that followed in the next few months. It was 1954 in Detroit, and I was 15 years old. I had gotten the AR-2 as a Christmas present, had passed my Novice exam and received the letter from the FCC with my callsign, WN8REG, along with offers from Walter Ashe, World Radio, ARRL, and others offering QSL cards, equipment, and memberships. It was a very special time!

I didn't have a ghost of a chance at a commercial transmitter, but a month or two after my ticket arrived, I found a big old Zenith radio in a neighbor's trash and realized it had the bulk of

15 year-old N4NM received an AR-2 for Christmas





N4NM's found plans for his first transmitter in the ARRL's "How to Become a Radio Amateur"

what I needed for a simple rig: a power transformer, choke, filter capacitors, and a tube (6V6). The simple transmitter described in ARRL's "How to become a Radio Amateur" required only the addition of a crystal, a variable capacitor and an RF choke. My paper route had provided just enough profit to bankroll those parts, so I took the bus downtown to Reno Radio, a ham radio mecca with just about anything you would need to homebrew a complete station. The rig was built on a cigar box with a front panel from scrap furnace ductwork sheet metal. I tuned it by holding a neon bulb tester near the tank coil, tuning for maximum brightness. Antenna switchover from RX to TX was done with a hardware store knife switch.

In my haste to get on the air, I decided to use the old Zenith as the power supply, just tapping into its existing B+ line. That saved some time, 'cause I was really, really excited about getting on the air at last! When the rig was ready for testing, my Dad suggested we call a neighbor who was an FCC monitoring inspector, and ask that he listen to my signal. We got him on the phone; I ran into the "Hamshack Closet", and sent a series of "V"s followed by "DE WN8REG AR". When I ran back to the phone, my Dad was red-faced...the inspector had said "Take that thing off the air; you're sending pure AC". Well, folks, I was pretty well crushed. But he did offer to listen again after I got the thing fixed.

It turned out that when I had tapped into

My Favorite Rig (cont.)

By Chuck Lewis, N4NM

the Zenith's B+, I was on the wrong side of the filter capacitor & choke. So, the tube was being fed unfitered DC. No wonder it sounded harsh! Later, after correecting the mistake, I got a clean bill of health from our neighbor, and could begin calling stations. I filled a dozen pages in my logbook with CQs, lists of called stations, and "Test de WN8REG", but with nothing in the RST column. It took about a week and a half before I logged my first contact. Hand shaking, sweat dripping, barely able to copy my own callsign, I worked WN8ROP, all of five or six miles away! WOW.

That was pure magic --- magic that would never be re-created. Now, 67 years later, I can still smell the parts as they came out of the bag from Reno Radio, I can still feel the panic of that phone call, the feeling of sitting in my radio closet, the elation of the first contact, and my pride at finding WN8ROP's QSL card in the mailbox. There has been a lot of new hardware in my shack since then, but there will never again be a setup as memorable as my AR-2 and 6V6 on a cigar box!

My Favorite Rig

By Byron Allen, N4AX

Does anyone have just a single favorite rig? I think not, if they have been on air for years! Some of us swap and try rigs a lot. As for me, many times a year. But my goal is to not only to try all the rigs, but buy and sell, repair or whatever I need to do so the hobby funds itself. The only time I used the joint bank account, or joint credit card resources to buy radio gear was as I started the hobby in the mid-eighties. My first NEW rig was a ICOM IC-735 with matching PS-55 power supply. I liked this rig so much, that I have owned 4 of them during my amateur hobby. I ordered that rig, sat it in front of me and listened around the bands as an incentive to take and pass the FCC exams. My first rig prior to that was a Used YAESU FT-101ZD bought from a ham friend.

I will say in order of preference "My favorite rigs, by brand, are Elecraft, Icom, Yaesu, Ten-Tec, and Kenwood last. I have owned more Ten-Tec rigs than any other brand and Icom second to those, then when Ten-Ten changed owners, I was using a Ten-Tec ORION, wonderful rig. I still think the ORION, the Omni V, Omni VI were the best CW rigs I have owned, I am a 95% CW operator, I make contacts daily using CW, nowadays to and from work in the mobile. I have over the years owned and used some of the "Vintage" brands, Hallicrafters, National, Heathkit, Drake, Hammerlund all good solid radios that's many of them are still around in use.

Since I broke the Ten-Tec cycle due to the last straw being a conversation with the new owner, I have owned many Elecraft radios, which I believe is the best all-around if you're going to buy a high-performance rig, meaning expensive! I currently use a Elecraft KX3 with a hamstick, last week we had a 20 Meter opening and I worked a JA driving to work, for the KX3 that is 15 Watts max. The KX3 I find performs equally to the K3 that I owned, and some features are more handy on the KX3. I also own the Elecraft KXPA100/ KXAT100 Combo that is mounted in a Pelican transit case with a power supply, for that go station and to quickly set up for the 100 watt with antenna tuner type operations.

Yes, some of the newer rigs have menus, sub-menus, etc. So many more manipulative features than with earlier rigs that had a single knob for all the primary control features. But if you spend the time playing and trying digital features, they can really improve intelligibility. For me as an operator on CW mode, the best advice came from a close friend N4NO-SK, Jerry said set your sidetone to 400 or 500 Hz and use your RF Gain, for my ears this was good advice , previously I always used the default 600-700hz range and always kept RF Gain at full range. So at this point in my amateur hobby, ICOM makes a consistently great radio, but my pick is Elecraft, easy to repair, easy to get parts, the user community is awesome and helpful, like TenTec users once were. I have made many upgrades and repairs to many model/ brands of radios over the years. Yes, I have owned a few Kenwoods, they just were never as good comparatively. But everybody likes what they currently own, for me if I don't like it, I will tell you

My Favorite Rig (cont.)

By Byron Allen, N4AX

what I don't like and then swap it.

It would be fun to me if I sat down and just created a list of every radio I have owned, I'm afraid that would fill 3-pages here in the LongPath newsletter, especially since many models I have owned repeatedly thru trades, purchases, estate buy outs, etc.

My Favorite Rigs

By David Shealy, K4KSV

I have two favored rigs which are my current rig and my first rig which was a Heathkit DX-35 that I built during late summer of 1956 when I was first licensed in SC as KN4KSV with the help of a neighbor who was a licensed ham with a son my age. I put up 40M dipole and was amazed with ease of working many people with CW, but I did not know at the time that during late 1950's was a very high Sun spot cycle, but I do recall receiving TV stations from all over southeastern US at this time. During late summer of 1957, I upgraded my license to a general class becoming K4KSV and obtained a triband beam antenna installed on a telephone pole that was put on our lot by a friend of my family. Then, I began working DX very well using SSB from NA, SA, AF, EU, and Oceania and exchanging QSL cards, but my active DX seeking delayed while I was going to the University of Georgia for physics degrees until summer 1974 when I sent up a 100-foot tower, triband beam and was using a SB-220 in Birmingham. By early 1980, I had established my first DXCC with 221 confirmed countries via QSL cards. My working DX waned during the 1980's as work and family responsibilities took more time until I retired from UAB in fall 2015, when my wife suggested that I buy new ham radio, which was an ICOM 7600 and was useful in making 2,272 QSO's using wire antennas through July 2019.

My best rig is an ICOM 7610, which I have used since August 19, 2019, for a total of 3,863 QSO's where 65% of these QSO have been made using WSJT-X FT8 or FT4. The ICOM 7610 has some very attractive features which are helpful in using WSJT-X for FT8 or FT4 modes, such as, the mode USB-D2. Also, there is a Japanese newsletter in English entitled "Let's operate FT8 with the newly announced IC-7610", which fully describes how to operate WSJT-X and all of its modes and features, such as, Fox & Hound used for working DX-Peditions.

My Favorite Rig

By Rob Suggs, NN4NT

My favorite rig is my current Yaesu FTDX 101D which has been discussed by several of us in previous issues of the Long Path. But prior to obtaining it last year, my nostalgic favorite was my humble Ten Tec Argonaut 509. I bought it at the El Paso hamfest in 1978 for $275 ($1146 in today's $s!). I was in grad school at New Mexico State University (NMSU) at the time and that was a couple of weeks after I had passed my Advanced Class exam and moved from Technician Class so I was celebrating the upgrade. The Argonaut (Fig. 1) was a QRP phone and CW transceiver with a decent receiver. The slide frequency dial wasn't well-calibrated which made it a bit tough to figure out your exact frequency so I built a marker generator from a QST design. To further trick out the rig, I found an old mechanical filter in some surplus medical test equipment (which may have been used to test monkeynauts at Holloman AFB) which I routed the audio through to give a bit better CW performance. I put that in a box with a homebrew 12v power supply and the aforementioned marker generator. We used that rig in a few NMSU Amateur Radio Club (W5GB) Field Days and did quite

My Favorite Rig (cont.)

By Rob Suggs, NN4NT

well from our perch atop a 6600 ft mesa next to an observatory. I also used it to listen on 10m and make some contacts through Oscar 8 by keying the mic of my Kenwood TR7600 2m FM rig to send some very chirpy CW.

Figure 1 – Ten Tec Argonaut 509

After the making a lot of contacts on QRP phone for a few months I decided to add an amplifier. A mostly pre-built 100w solid-state RF deck with heatsink was available from a QST vendor. I nervously soldered in the power transistors, built the bandpass filters, and powered the whole system with a car battery. I haven't found a picture of the amp but recently found a drawing (Fig. 2). Operating on a 40/15m dipole from my student apartment next to a noisy power substation, I had a great time and made many contacts. A few years later I bought a Kenwood TS-530 and sold the Argonaut and amp at the Mesilla Valley ARC Beanfeed and Swapmeet. That was a great ham

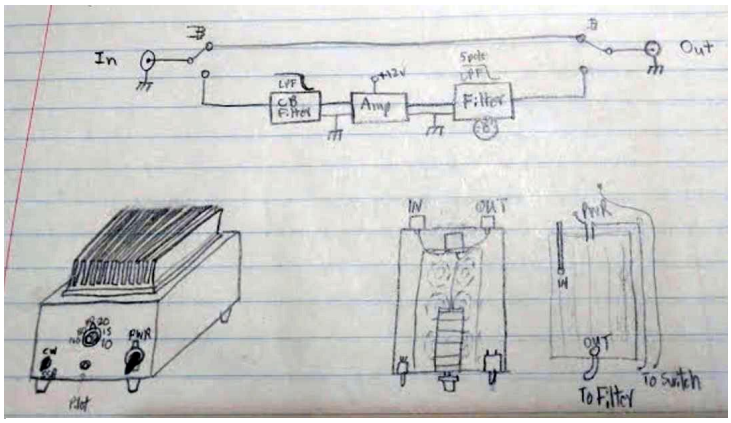


Figure 2 – Drawing of NN4NT's first HF amp build

event near Las Cruces, NM where they served up the finest beans and green chilis I've ever eaten. Thankfully it was in an outdoor pavilion ;-). I frequently wish I had kept that Argonaut. I've seen a few at the Hamfest and enjoyed seeing one while operating at Ten Tec headquarters in Sevierville, TN a few years ago. It was a great rig and was my introduction to transceiver-based HF operations. By the way, I used the Argonaut and amp for Field Day in 1982. While scanning through my paper logbook (the only way to do it back then) I found a contact with K4BFT 6A AL on 20m phone!

My Favorite Boatanchor

By Walter Miller, AJ6T

I can't claim that the WW2 surplus BC-348-N receiver that I used as a Novice in 1965 is my favorite rig (that honor goes to my Elecraft K3s), but it certainly is the one I recall most fondly. My father had purchased the BC-348-N at Radio Row in NYC in the late 1950s, and I used it for HF SWLing for years before I got my amateur radio license. I still have the collection of QSL cards from the likes of Radio Moscow, BBC and HCJB and many other foreign broadcast stations. The only major modification that we made was to replace the dynamotor with an internal AC-DC power supply. The receiver was very well built with an attractive black matte finish and an extremely solid feel to the clunking of the band switch. The tuning knob was very smooth, much better than most of the amateur rigs of the day. Designed for AM and CW service, the receiver worked pretty well on foreign broadcasts, but with just a single crystal filter and tunable BFO it was marginal for CW and SSB reception. The radio tuned from 200 -500 KC and 1.5-18 MC in six bands, and saw military service mostly on aircraft such as the B-17 and B-24 bombers. As my novice CW receiver when I was WN2REE in New Jersey at least I can say that the BC-348-N helped me hone the ability to pick out one tone from several signals heard simultaneously. Unfortunately the BC-348-N no longer is operational, but it is still in my junk box and I plan to restore it someday in memory of my father (Dave Miller, KD2DH, SK) who encouraged me to get into ham radio.

My Favorite Boatanchor (cont.)

By Walter Miller, AJ6T

The Irrepressible BC348 Receiver

History of the BC-348 Receiver

Restoration of a BC-348 Receiver

Surplus WW2 BC-348-N receiver

My First HF Transceiver

By Bruce Smith, AC4G

While I was studying for my Bachelor of Science in Electrical Engineering from Tennessee Tech University (TTU) in the late 1970's thru early 1980's, I was fortunate to operate the TTU HF club station on the 5th Floor of Prescott Hall. Living in a dorm allowed me to get to the shack in minutes, since it was in short walking distance from my dorm to the shack. The TTU club station consisted of Drake twins (T4 transmitter & R4-B receiver), a Heathkit HW-10 HF rig, a Hallicrafter HF amplifier, a Hygain tribander antenna, and dipole antennas. I was spoiled by having a station to get me on the air, but sometimes may have spent too much time in the club station's shack. I increased my CW speed by checking into the nightly TN CW Net and by using the Heathkit HW-10 rag-chewing with other hams in my spare time.

After graduating from TTU, I decided I needed an HF rig to get me on the air from my new home in Fayetteville, TN. I had experience using the TTU Drakes and Heathkit, so I gained some on-the-air experience and knowledge to know what I might need for my home station. At the time, it seemed to me that Kenwood rigs dominated the market, but Yaesu, Tempo, Heathkit, and a few other manufacturers had their rigs, so I did some research and figure out which rig would best suit me. After a few months of deciding, I purchased a "demo" Kenwood TS-530S HF transceiver from one of the major ham radio outlets of the time due to the price being less than a new rig.

I was drawn to the Kenwood TS-530S because it was one of the modern rigs of that day in 1984. The TS-930S was the fancy Kenwood HF rig being sold at that time and was featured in many of the ham radio magazines back then. From time to time the TS-530S would have a half-page ad. The main reason I decided to purchase this rig was mainly because it was one of the first to allow operations on the WARC bands (30m; 17m; and 12m). Older HF rigs prior to this generation of rigs like TTU's Drake Twins & Heathkit as well as the TS-520 and TS820 era of rigs did not have WARC band capability. Some of the fancy rigs at that time like the newer TS-930S might have had some wide band receive capability, but most were strictly kept in only the amateur radio bands and nothing outside of the ham bands.

My TS-530S featured four items that appealed to me. First, (1) my TS-530S had filter slots for purchasing a SSB filter and narrow CW filter, which I added. The final was not a transistor pair, but a 6146B tube. The 6146B was designed in many of the rigs of that era. It required me to "tune-up" my rig adjusting the "TUNE" and "LOAD" knobs for minimum Plate current on the 6146B and/or maximum output power. It would deliver 220 watts PEP on SSB and 180 watts for CW. Back then, the FCC rules were different than today and required measurements at the plate not final output power like today. (2) My TS-530S had a

My First HF Transceiver (cont.)

By Bruce Smith, AC4G

place to add an external VFO. This was important back then because many of the DXpeditions began to operate split. Kenwood had an analog display version and a digital display version. Obviously, the digital readout was fancy, but cost drove me to purchase the cheaper analog display version. In order to find my operating frequency with some precision, I simply pressed the VFO SPLIT button on the transceiver and adjusted to dial to read my frequency of the transceiver display, not the analog dial on the external VFO. (3) Next, the TS-530S power supply was built-in and I simply plugged the 530S into the wall 120 VAC outlet to power it up. (4) Lastly, an external speaker could be purchased to hear well, better than the OEM supplied speaker. Needless to say, I purchased the matching speaker.

How well did the rig perform for me? I was on the air using this rig for fourteen (14) years and yes, achieved DXCC Honor Roll at 328 confirmed with this rig. I decided I need a new rig in 1998 and upgraded to a Kenwood TS-850. I always thought the receiver capability was exceptional on the 530S until I purchased the TS-850. I finally realized I may have been missing out with my receive capability, but I do not regret operating this TS-530S rig as long as I did, because my DXCC totals really showed what I achieved. Today on 30m (one of the WARC bands) I am sitting at 300 DXCC countries confirmed; 312 DXCC countries on 17m (another WARC band); and 255 DXCC countries on 12m (the other WARC band) I also worked the last Dxpedition to Bouvet Island on 15m and many other DXCC countries in different modes with my TS-530S. No, I have no regrets with my decision to purchase the TS-530S. With the performance of this rig, it has propelled me fairly high into the current DXCC standings especially on the WARC bands and groomed me into the DX'er I am today. Thank you Kenwood – you really helped me to achieve many goals as a radio amateur!

My Favorite Rig

By Bob DePierre, K8KI

I've been a ham for such a long time that you'd think I would have hit 300 countries decades ago. But not so. Two problems:

1. I've had to move many times. This is our 15th QTH over three continents. Each QTH comes with its own problems, not the least of which involves putting up antennas. Years ago, when the Air Force sent me to Turkey, I had the chance of a lifetime to meet their minister of communications. I asked him if he'd permit me to have a ham license, and he agreed. WOW! A few days later when I got back home, I put up a dipole on the roof of my apartment building. The neighbors tore it down almost immediately. I was a foreigner, and they thought all foreigners were spies. It didn't matter that I had that license. After the second time this happened, I gave up.

2. Many of you have heard me say I've been condemned to the life of an engineer. I can't help it. When I get a new rig home, my first impulse is to tear it apart and analyze it. I can usually get it back together and working, but not all the time. I once bought a very nice IC-745. It was still not working when I sold it 20 years later.

TenTec Jupiter HF Transceiver

Everywhere I traveled, I managed to find good ham radio clubs, but I never learned how to work DX or contests. Then again, two things happened: I moved to Huntsville, and I found a TenTec Jupiter. There are some very aggressive

My Favorite Rig (cont.)

By Bob DePierre, K8KI

hams here who will teach you how to dig in and find the DX. It took me about five years to realize this. At about the same time I bought the Jupiter at our hamfest. It wasn't a particularly high-performance piece of equipment, but it worked very nicely, and it had a CAT port, which tied me into all the DX and contest databases. I was on the air in a big way! I almost wore out that radio over the next three years. I learned a lot during that time. I wish I had learned it 40 years earlier.

Thanks to that Jupiter, I learned how I wanted my ultimate station to work. I wanted all the equipment to be highly integrated. I didn't want "debris," such as equipment not engaged in the current pursuit, to enter my field of view while operating. I wanted computer programs to speak to each other seamlessly. When I clicked on a spot, I wanted all the equipment to react in concert. I wanted all to be no-tune, no antenna switching, no meter switching. I wanted to hear the DX immediately and start calling without worrying about the wrong antenna, or touching the amp, or having to hit the mode button. For the first time, I have all the components doing precisely what I want. I sure hope I don't change any of my specs. That poor old Jupiter put me on the right track.

A Lifetime of Heathkits

By Steve Werner, AG4W

Heathkit has had in impact on ham radio for me since 1965 when I was 12 years old. My first transmitter was a used crystal controlled DX-20 running 50 watts input to a 6DQ6 tube. This transmitter was sold new from 1956 to 1961. When they were new they were $36 and I bought mine used for $20. I had a Heathkit ham band only HR-10 as my first receiver. I still remember buying it used at Tydings on Liberty Avenue in Pittsburgh, PA. This store sold electronic parts, new and used ham radios and was operating since 1930 as shown by their 10th anniversary 1940 catalog. My first coax connector to the antenna on the DX-20 had a short so I destroyed the 6DQ6. Not many hams can claim they blew a final before their first contact. I had no SWR bridge when I started. A local ham brought one over to discover the short.

Tydings Co. catalog

After I passed my General exam I upgraded to a used Heathkit DX-40 that had a 6146 final tube with 75 watts input and could operate AM as well as CW. I bought it from a local ham and talked him down from $40 to $37. The DX-40 first came out in 1958 and was $65. I added an external VFO and upgraded my receiver to a used Hammarlund HQ-129X. I saw it advertised in the Pittsburgh newspaper want ads. The HQ-129X was first sold in 1945 for $129. After World War 2 they sold for $173. Because of my experience with the old Heathkit transmitters I had no problem replacing the paper capacitors that had failed in the receiver.

A year later I sold the DX-40 and bought a Heathkit DX-100. It had two 6146 final tubes, two 1625 modulator tubes and a built in VFO. It put out over 100 watts. This transmitter was 107 pounds and the HQ-129X was 47 pounds so my dad helped me build a sturdy table. I purchased the DX-100 at the Breezeshooter's hamfest and when I got it home I quickly figured out it didn't work. This was when I learned the hard lesson that not all good deals at hamfests are what they

A Lifetime of Heathkits (cont.)

By Steve Werner, AG4W

are. About half the tubes were bad and several components. It took me almost all summer to get it working. It took so long since I had to mow a lot of lawns to pay for the tubes.

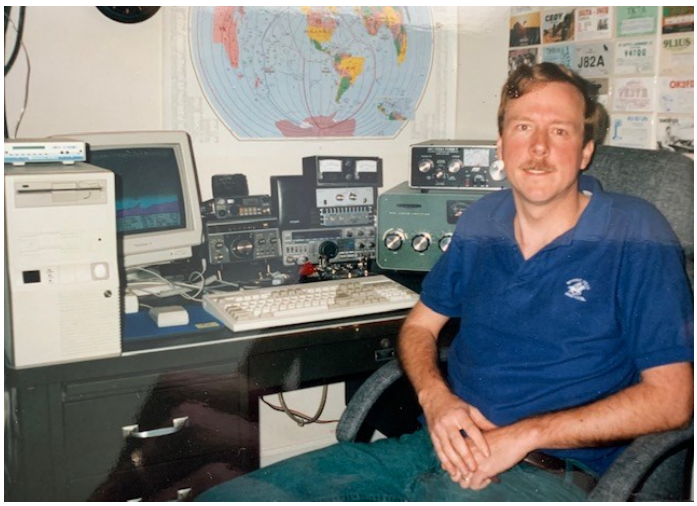
AG4W working stations with his DX-40 and HQ-129X

The following summer when I was 15 I sold the DX-100 and HQ-129X and purchased a new Heathkit HW-32A. I had a great time building it. It was a 20 meter only single sideband transceiver. Then I upgraded my inverted V to a Hygain 3 element 20 meter beam and shortly after that I earned DXCC. The next summer at age 16 I earned enough to buy a Heathkit HW-100. I really did a great job building that all band transceiver since I used a NASA soldering specification as a guide for soldering. For $240 the HW-100 was a great value. It was obvious to me that Heathkit borrowed a lot of their design from the Collins KWM-2. One of the differences is the HW-100 had a FET VFO.

Heathkit made it easy to build, troubleshoot and align their equipment by having excellent manuals with great illustrations. My first oscilloscope was also Heathkit. I loosely coupled my transmitter output directly to the CRT to monitor my output signal.

I used my HW-100 up until 1985 when I got an all solid state Kenwood TS-430S which I used for about 15 years. I have also owned a used Heathkit SB-220 linear amplifier for about 30 years. I think this was the best value of all the amplifiers ever made. I bought mine from an estate sale and incorporated many modifications into it. My recent conversion of it to 6 meters has extended its life again. The two 3-500Z tubes are really economical once the Chinese started to make them.

I can certainly credit Heathkit with increasing my interest in electronics and with developing some of my technician and design skills. I like others was disappointed that Heathkit did not survive. I am glad that small businesses like QRP Labs make some great kits for those interested in really getting to know your radio just like Heathkit use to.



AG4W with his TS-430S and SB-220

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